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## CONTENTS

1994 - Part 1

- The Birds of the Endrick Mouth, Loch Lomond:  
An Update of the Annotated Check-List up to  
1st January 1990**  
By Mr. John Mitchell 3-30
- Factors Affecting Nesting Success of Hooded Crows  
in West and North-West Scotland**  
By Dr. Raymond Hewson and Mr. T.R. Talbot 31-38
- The Nesting of the Curlew in Britain:  
An Analysis of Records, 1946-1985**  
By Dr. Paul B. Heppleston 39-57

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# THE BIRDS OF THE ENDRICK MOUTH, LOCH LOMOND: AN UPDATE OF THE ANNOTATED CHECK-LIST UP TO 1st JANUARY 1990

By JOHN MITCHELL  
*Scottish Natural Heritage*

## Introduction

The first edition of the annotated check-list of the birds of the Endrick Mouth, published with a description and history of the area in the *Scottish Naturalist* (1984: 3-47), summarised all the known records up to 1st January 1980. Over the next decade an additional sixteen species were added to the check-list, together with a number of changes in the status of species already recorded. A revised second edition of the Endrick Mouth check-list would therefore now seem to be appropriate.

## Systematic List

With only minor alterations, in accordance with local usage, this second edition of the annotated species-list continues to follow the *List of Recent Holarctic Bird Species* by Professor Karel H. Voous (1977). Where applicable, the use of square brackets indicates (a) the species has not been unreservedly accepted on to the British and Irish list, or (b) the description of the bird submitted to the *British Birds* rarities committee was considered insufficient for complete acceptance of the record.

With 226 species, plus an additional seven sub-species, recorded at the Endrick Mouth on one or more occasions, there are insufficient descriptive terms available to define precisely in a few words the status of every bird. The following generalised descriptions must therefore suffice:-

Present throughout the year:

- can occur in every month of the year.

Present for much of the year:

- can occur most months of the year.

Summer Visitor:

- seasonally present during the middle months of the year.

Winter Visitor:

- seasonally present during the early and late months of the year.

Passage Migrant:

- unless stated otherwise, occurs with some regularity on spring and/or autumn passage, but not necessarily annually.

Occasional Visitor:

- occurs with some regularity, but most have no definite pattern as to season.

Irregular Visitor:

- occurs only intermittently, but there are more than five modern records.

The number of occurrences is stated for any species recorded on only five or less occasions.

Wherever the information is available, an indication is given of the numbers in which each species has occurred. As the result of systematic monthly counts, any wildfowl which occur regularly in winter have been treated as special cases, and an analysis has been undertaken of the previous five years' figures (1985-1989 inclusive):

Peak Winter Population (Swans and Geese):

- figure derived from the average of the highest *single* count in each of the five years.

Regular Winter Population (Ducks):

- figure derived from the average of the *three* highest counts in each of the five years.

All the additional individual records are referenced, including those pre-1980 records in the first edition of the check-list which were appearing in print for the first time. The principal paper (Mitchell, 1984a) should be consulted for all other references.

The following abbreviations are used throughout the check-list:-

- BB - British Birds.  
 CB - Clyde Birds.  
 CBR - Clyde Bird Report.  
 LLBR - Loch Lomond Bird Report.  
 SB - Scottish Birds (including the *Scottish Bird Report* 1968-1977 and 1985-1986).  
 SBR - *Scottish Bird Report* (produced as a separate publication for 1978-1984 and 1987-1989).  
 SN - *Scottish Naturalist*.

#### RED-THROATED DIVER *Gavia stellata*

Irregular Visitor. Mainly winter records, but birds in summer plumage have occurred, including a pair display flying 21 May 1983 (LLBR 12: 3). Highest recorded number - four, 27 April 1986 (LLBR 15: 3).

#### BLACK-THROATED DIVER *Gavia arctica*

Two records. Single, first seen 21 January 1966, and found dead eight days later (SN 1984: 14). Single, 12 April 1986 (LLBR 15: 3).

#### GREAT NORTHERN DIVER *Gavia immer*

Three records. Undated record of a single found dead by estate gamekeeper (SN 1984: 14). Two, 2 September to 7 October 1962, one remaining until 16 February 1963. Single, 19 - 20 November 1984 (SBR 1984: 11).

#### LITTLE GREBE *Tachybaptus ruficollis*

Occasional Visitor. Mainly in ones and twos outwith the breeding season, although summer displaying birds have occurred. Highest recorded number - four, 27 January and 6 October 1963 (SN 1984: 14).

#### GREAT CRESTED GREBE *Podiceps cristatus*

Present throughout the year. No breeding record, but pairs displaying March - April 1982 and 1983 (LLBR 11: 3 and 12: 3). Highest recorded number (around the Aber Isle) - 24, 26 November 1989 (CBR 1989: 9).

#### RED-NECKED GREBE *Podiceps grisegena*

Irregular Visitor. All winter records of singles.

SLAVONIAN GREBE *Podiceps auritus*

Irregular Visitor. All winter records of singles.

BLACK-NECKED GREBE *Podiceps nigricollis*

One record. Single, 14 February to mid April 1982 (*SBR* 1982: 13). A published record of a single on 16 April 1961 was subsequently withdrawn (*SN* 1984: 13).

FULMAR *Fulmarus glacialis*

Irregular Visitor. All but one record of singles, usually found dead March - August. Two, during westerly gales, 3 January 1984 (*SBR* 1984: 13).

STORM PETREL *Hydrobates pelagicus*

One modern record. Single, early 1946 following gales, was seen for about ten days (*SN* 1984: 14). This species appears to have been recorded more regularly on Loch Lomondside in the 19th century.

LEACH'S PETREL *Oceanodroma leucorhoa*

One modern record. Single, found dead 9 November 1952 following 'wreck' of Leach's Petrels throughout Scotland. This species appears to have been recorded more regularly on Loch Lomondside in the 19th century.

GANNET *Sula bassana*

Irregular Visitor. Mainly singles. Highest recorded number - seven, 2 May 1983 (*LLBR* 12: 3).

CORMORANT *Phalacrocorax carbo*

Present throughout the year. No breeding records. Maximum population on the occasions when low water in late summer and autumn exposes the rocky reef around the Aber Isle. Highest recorded number - 88, 14 October 1972.

SHAG *Phalacrocorax aristotelis*

Two records. Single, 22 September 1969 following gales. Single immature, 13 October 1985 (*SB* 14: 94).

BITTERN *Botaurus stellaris*

Irregular Visitor. Most recent records of singles during the winter.



GREY HERON *Ardea cinerea*

Present throughout the year. Breeds. Two colonies - Gartfairn Wood and Buchanan Castle grounds. At peak, 39 occupied nests in 1974 and 1978. A gradual decline in the number of breeding pairs (as elsewhere on Loch Lomondside) throughout the late 1970s and the first half of the 1980s, with only eleven occupied nests in 1986. Recovery to a minimum of 26 breeding pairs by 1989 (CB 3: 12).

SPOONBILL *Platalea leucorodia*

One record. Single, 13 June to 3 July 1971.

FLAMINGO *Phoenicopterus* sp.

[One record. Single, identified as the Chilean race *Phoenicopterus chilensis*, 30 July to mid-September 1966].

MUTE SWAN *Cygnus olor*

Present throughout the year. Breeds. Five nesting pairs in 1988 and 1989 (CB 2: 12 and 3: 13). Moulting flock build-up in summer and autumn before dispersing to the Leven Mouth and Clyde Estuary. Peak winter population - 13. Highest recorded number - 47, 15 October 1972.

BEWICK'S SWAN *Cygnus columbianus*

Occasional (winter) Visitor. Until 1969 usually 2-5 birds, but has become progressively more scarce in recent years. Highest recorded number - 26, late October 1968 (SN 1984: 16).

WHOOPER SWAN *Cygnus cygnus*

Winter Visitor (feral birds throughout the year). Regular, but winter numbers have gradually declined in recent years. Peak winter population - 20. Highest recorded number - 92, 17 March 1963 (SN 1984: 16). One or two feral pairs have nested almost annually since 1979 (BB Rare Breeding Birds Panel annual reports).

BLACK SWAN *Cygnus atratus*

[Two records. Single, 25 February 1985. Single, from 4 July 1985, being joined by a second bird from 24 October. Pair last seen 19 November (LLBR 14: 3)].

CAPE BARREN GOOSE *Cereopsis novaehollandiae*

[One record. Two, 29 September to 11 November 1989 when one was killed. Remaining bird present up to 20 December (LLBR 18: 3)].

SWAN GOOSE *Anser cygnoides*

[One record. Single, 4 May to early June 1984 (LLBR 13: 3)].

BEAN GOOSE *Anser fabalis*

Formerly regular Winter Visitor. Last flock on record, 16 birds 4-8 January 1972. Highest recorded post-war number - 30, 22 February 1953. A pair of feral Western Bean Geese *Anser fabalis fabalis* nested in 1978 and 1979.

PINK-FOOTED GOOSE *Anser brachyrhynchus*

Passage Migrant (occasional Winter Visitor). Large skeins pass over the area in autumn, but the return passage in spring is less well marked. Occasional flocks briefly stop-off. Highest recorded number stopping-off - 1,000, late September 1985 (LLBR 14: 3).

WHITE-FRONTED GOOSE *Anser albifrons*

European race *Anser albifrons flavirostis*. One record. Two, November 1960.

Greenland race *Anser albifrons albifrons*. Winter Visitor. Regular since 1960. Peak winter population - 269. Highest recorded number - 330, 20 November 1988 (LLBR 17: 2).

GREYLAG GOOSE *Anser anser*

Winter Visitor (feral birds throughout the year). Peak winter population - 1,240. Highest recorded number - 3,000, February and November-December 1978. Breeding of feral Greylags first recorded in 1973, with three nests found in 1975. Only one nesting record since then.

BAR-HEADED GOOSE *Anser indicus*

[One record. Single, 15 January 1978].

SNOW GOOSE *Anser caerulescens*

Four records. All singles, usually in company with Greylag Geese - 21 September to 1 October 1974, 1 March 1975 (SN 1984: 17), 14 February to 12 April 1976, late August to September 1983 (SBR 1983: 12).

CANADA GOOSE *Branta canadensis*

Present for much of the year (usually absent during the period of summer moult). Peak winter population - 15. Highest recorded number - 57, 17 September 1972. One or two pairs initially nested annually from 1968 and throughout the 1970s, but only two records in the 1980s.

BARNACLE GOOSE *Branta leucopsis*

Passage Migrant (occasional Winter Visitor). Irregular. Highest recorded number - 59, 27 September 1977.

BRENT GOOSE *Branta bernicla*

One modern record. Single, identified as Atlantic or Pale-breasted race *Branta bernicla hrota*, 21-28 February 1960 (*SN* 1984: 18). One 19th century record of a single shot on 28 February 1898 (Mitchell, 1982).

RUDDY SHELDUCK *Tadorna ferruginea*

[Two records. Singles, 11 April 1979 and 30 November 1987 (*SBR* 1987: 13)].

SHELDUCK *Tadorna tadorna*

Summer Visitor (occasional birds at other times of the year). Breeds. Most pairs which hold territory at the Endrick Mouth actually nest just outwith the boundaries. Following a peak in the 1970s, the territorial population stabilised at about 18 pairs by 1980, to be followed by a marked fall in the number of pairs and breeding success, together with the virtual disappearance of the non-breeding population. Highest recorded number (full-grown birds only) - 124, 4 June 1978.

WOOD DUCK *Aix sponsa*

[Nest and eggs reported in 1962 following escape of a full-winged pair from a local wildfowl collection (*SN* 1984: 18)].

MANDARIN *Aix galericulata*

Four records. All singles - 13 December 1974, 23 November 1975, 18 February 1977 and 17 April 1977.

WIGEON *Anas penelope*

Present throughout the year. Breeds only occasionally. Autumn and winter influx. Regular winter population - 487. Highest recorded number - 1,000; 15 October to early December 1984 (*SBR* 1984: 17).

AMERICAN WIGEON *Anas americana*

One record. Single male, 19-22 May 1985 (*SB* 14: 98).

GADWALL *Anas strepera*

Occasional Visitor, particularly in spring. No indication of breeding. Highest recorded number - six, 3 November 1963 (*SN* 1984: 21).

TEAL *Anas crecca*

Present throughout the year. Breeds. Autumn and winter influx. Regular winter population 374. Highest recorded number - 2,000+, late October to early November 1983 (*SBR* 1983: 14).

MALLARD *Anas platyrhynchos*

Present throughout the year. Breeds. Autumn and winter influx. Regular winter population - 209. Highest recorded number - 1,000, early September 1986 (*SB* 14: 229).

PINTAIL *Anas acuta*

Occasional Visitor, particularly in spring. No indication of breeding. Highest recorded number - eight (four pairs), 12 March 1967 (*SN* 1984: 21).

GARGANEY *Anas querquedula*

Passage Migrant (Summer Visitor). Irregular. Nesting suspected in 1979 and 1986, but not proved. Highest recorded number - four, 18-26 May 1986 (*LLBR* 15: 3).

SHOVELER *Anas clypeata*

Present for much of the year (absent in winter during severe weather). Breeds. Census in 1973/74 showed at least ten territorial pairs, with little sign of any change since then. Regular winter population - 15. Highest recorded number - 100+, October-November 1980/81/82.

RED-CRESTED POCHARD *Netta rufina*

One record. Single female, 3 August 1980, possibly of captive origin (*SBR* 1980: 21).

POCHARD *Aythya ferina*

Winter Visitor (occasional summer records). May have bred in 1977. Regular winter population - 11. Highest recorded number - 107, 18 February 1974.

TUFTED DUCK *Aythya fuligula*

Present throughout the year. Breeds. Occasional winter influx. Regular winter population - 22. Highest recorded number - 109, 13 March 1966 (*SN* 1984: 22).

SCAUP *Aythya marila*

Winter Visitor (occasional summer records). Irregular. Usually singles or pairs. Highest recorded number (full-grown birds only) - five, 2 December 1951

(SN 1984: 22). Female with broods of small young recorded 1987/88/89, but may have nested outwith the recording area (BB Rare Breeding Birds Panel annual reports).

LONG-TAILED DUCK *Clangula hyemalis*

Irregular Visitor. All singles, all but one record of females/immatures in winter. First year male throughout the summer of 1976.

COMMON SCOTER *Melanitta nigra*

Irregular Visitor. All summer records, mainly singles and pairs. Females with young recorded in 1978 and 1979 almost certainly nested outwith the recording area.

VELVET SCOTER *Melanitta fusca*

One record. Single male, 5 November 1979.

GOLDENEYE *Bucephala clangula*

Winter Visitor (occasional records at other times of the year). Regular winter population - 14. Highest recorded number - 50, 30 November 1979. May have bred in 1979 - pair seen up to 22 May, followed by female with single young, 8 September.

SMEW *Mergus albellus*

Winter Visitor. Usually single red-heads (females and immatures), but pair present 1-15 March 1986 (LLBR 15: 3). Highest recorded number - four, 1 January to 3 February 1985 (LLBR 14: 4).

RED-BREASTED MERGANSER *Mergus serrator*

Present throughout the year. Breeds. Influx of young from elsewhere on the loch has occasionally resulted in large creches being formed, including one of 90 young, 12 July 1968 (SN 1984: 23).

GOOSANDER *Mergus merganser*

Present throughout the year. Breeds occasionally. Recent influx of sub-adult birds in late April to early May. Highest recorded number - 45, 8 May 1988 (CB 2: 23).

RUDDY DUCK *Oxyura jamaicensis*

Two records. Single male, 9 October 1985 (LLBR 14: 4). Pair, 24 April 1988 (SBR 1988: 17).

WHITE-TAILED EAGLE *Haliaeetus albicilla*

One record. Single immature (presumed reintroduced bird), 28 November to 3 December 1985 (*SB* 14: 100).

MARSH HARRIER *Circus aeruginosus*

Passage Migrant. Irregular. All singles and mainly females.

HEN HARRIER *Circus cyaneus*

Winter Visitor (occasional summer records). Usually singles, but two birds occasionally observed hunting in close proximity.

GOSHAWK *Accipiter gentilis*

Occasional Visitor. All singles. Almost annual in the 1970s, but only two recorded sightings after 1980.

SPARROWHAWK *Accipiter nisus*

Present throughout the year. Several regular territories known, but little information on the numbers of breeding pairs.

BUZZARD *Buteo buteo*

Present throughout the year. Breeds. Seven nesting pairs recorded during census in 1983 (Mitchell, 1984c).

ROUGH-LEGGED BUZZARD *Buteo lagopus*

Two records. Singles, 3-4 January 1960 and 4 September 1980 (*SBR* 1980: 25).

GOLDEN EAGLE *Aquila chrysaetos*

Two records. Single immatures, 20 December 1976 and 8 October 1983 (*LLBR* 12: 4).

OSPREY *Pandion haliaetus*

Summer Visitor (Passage Migrant). Annual from about 1964. Gradual increase in the number of sightings up to 1977, when nesting on Loch Lomondside seemed imminent. Thereafter, with the exception of 1981 and 1989, a fall-off in the number of sightings reported.

KESTREL *Falco tinnunculus*

Present for much of the year. Breeds occasionally. A marked decrease in the number of birds sighted, almost certainly as a result of the collapse in the small mammal population on the low ground due to frequent and prolonged flooding.

RED-FOOTED FALCON *Falco vespertinus*

One record. Single female, 17-19 May 1981 (Pollock and Weir, 1982).

MERLIN *Falco columbarius*

Occasional Visitor. All singles, between August and February.

GYRFALCON *Falco rusticolus*

Two records. Both singles - Greenland race *Falco rusticolus candicans* 3 April 1955, and nominate European race *Falco rusticolus rusticolus* November 1960.

PEREGRINE *Falco peregrinus*

Occasional Visitor. Most regular in late autumn when Woodpigeons gather for the acorn crop. Mainly singles, but 'pairs' recorded on several occasions.

RED GROUSE *Lagopus lagopus*

Two modern records. Both singles - 29 September 1981 (*CBR* 1981: 17) and 14 October 1989 (*LLBR* 18: 4). Estate game books indicate regular autumn occurrences of Red Grouse on the low ground in the 1880s.

BLACK GROUSE *Tetrao tetrix*

Two modern records. Both singles - 26 June 1960 (*SN* 1984: 24) and 25 September 1979. Estate game books show regular occurrences of Black Grouse on the low ground for the period 1880-1916.

CAPERCAILLIE *Tetrao urogallus*

Irregular Visitor up to 1980, but no records since. Following an introduction into the area in the early 1870s, stock maintained locally until the 1930s. Two hybrid Capercaillie x Blackcock recorded in the last century (Sir George Leith Buchanan correspondence 3/3/1885; in possession of author).

RED-LEGGED PARTRIDGE *Alectoris rufa*

Only three records up to the autumn of 1989, when 70+ reared birds released into the area (*CB* 3: 27).

GREY PARTRIDGE *Perdix perdix*

Irregular Visitor. Pairs and small coveys. Formerly bred. Fifty reared birds released in September 1986 (*LLBR* 15: 4).

QUAIL *Coturnix coturnix*

One modern record. Single, 7 June 1975. At least three past occurrences recorded in the estate game books.

PHEASANT *Phasianus colchicus*

Present throughout the year. Breeds. A recent revival of Pheasant shooting has led to several hundred reared birds being released into the area each autumn.

WATER RAIL *Rallus aquaticus*

Present throughout the year. Breeds. An elusive bird, but numbers appear to be on the increase following habitat improvements and a run of relatively mild winters.

SPOTTED CRAKE *Porzana porzana*

Five modern records. Three, 24 May to 3 June 1965; singles - 29 April 1966 (*SN* 1984: 25), 9-10 May 1976, 17 May 1978 and 28 August 1982 (*SBR* 1982: 23). Several 19th century records in the literature and estate game books.

CORNCRAKE *Crex crex*

Summer Visitor. Irregular. Formerly regular summer visitor and breeder. The last good year for Corncrakes in the area was 1965, with at least four individual birds calling (*SN* 1984: 25).

MOORHEN *Gallinula chloropus*

Present throughout the year. Breeds. Formerly a winter influx, but numbers now generally low in the surrounding area since the appearance of Mink.

COOT *Fulica atra*

Present throughout the year. Breeds. Autumn and winter influx, although numbers considerably lower since the appearance of Mink. Highest recorded number - 500, 27 January 1963 during a very severe freeze-up (*SN* 1984: 26).

OYSTERCATCHER *Haematopus ostralegus*

Summer Visitor / Passage Migrant (only the occasional bird in winter). Breeds. Passage most marked in late February to early March. Size of flocks very variable. Highest recorded number - 300, 12 March 1977.

AVOCET *Recurvirostra avosetta*

One record. Single, 1-2 June 1974.

LITTLE RINGED PLOVER *Charadrius dubius*

One record. Single, 17 April 1977.



RINGED PLOVER *Charadrius hiaticula*

Summer Visitor / Passage Migrant. Breeds. Maximum of four nesting pairs recorded in 1969, but only one pair in recent years, reflecting the Ringed Plover's decline as a breeding species on Loch Lomondside (Mitchell, 1989). Size of passage flocks very variable. Highest recorded number - 95, 23 May 1971.

GOLDEN PLOVER *Pluvialis apricaria*

Passage Migrant. Usually singles and small groups. Highest recorded number - 50, 2 October 1971.

GREY PLOVER *Pluvialis squatarola*

Passage Migrant. Most frequent in autumn. Usually singles. Highest recorded number - three, 26 September 1976 and 1 May 1989 (CB 3: 31).

LAPWING *Vanellus vanellus*

Present throughout the year. Breeds. Spring and autumn passage well marked, plus 'hard-weather movements' westwards during severe winter conditions. Highest recorded number - 1,000+, 5-6 March 1988 (CB 2: 32).

KNOT *Calidris canutus*

Passage Migrant (two winter records). Irregular. Most frequent late summer/early autumn (July-September). Highest recorded number - 21, 7 September 1978 and 31 August 1984 (SBR 1984: 26).

SANDERLING *Calidris alba*

Passage Migrant. Irregular. Most frequent late summer (July-August). Singles and small groups. Highest recorded number - twelve, 4 August 1977.

LITTLE STINT *Calidris minuta*

Passage Migrant. Irregular. Most frequent late summer/autumn (August-October). Singles and small groups. Highest recorded number - 17, 11 September 1978.

TEMMINCK'S STINT *Calidris temminckii*

Irregular Visitor. All singles. An unsuccessful breeding attempt occurred in 1979 (Mitchell, 1983; BB 74: 29).

PECTORAL SANDPIPER *Calidris melanotos*

Two modern records. Both singles - 18 October 1959 and 1 August 1982 (SBR 1982: 25). A single shot on 24 November 1882 was only the second record for Scotland.

CURLEW SANDPIPER *Calidris ferruginea*

Passage Migrant. Irregular. Mainly singles in late summer/autumn (August to early October). Highest recorded number - five, 4 October 1959.

PURPLE SANDPIPER *Calidris maritima*

Three records. All singles - 7 May 1972, 18 October 1981 (*CBR* 1981: 21) and 21 October 1986 (*LLBR* 15: 4).

DUNLIN *Calidris alpina*

Summer Visitor / Passage Migrant (only the occasional winter record). Breeds some years. Maximum of 3 pairs. Size of passage flocks very variable. Highest recorded number - 100, 14 October 1972.

RUFF *Philomachus pugnax*

Passage Migrant. Most frequent late summer/autumn (July-September), but several records of spring/early summer birds with males in full breeding plumage. Singles and very small groups. Highest recorded number - nine, 2 September 1974 and 23 August 1983 (*SBR* 1983: 22).

JACK SNIPE *Lymnocyptes minimus*

Winter Visitor / Passage Migrant. Irregular. Usually singles. An exceptional record of two displaying over a sedge meadow, 19 May 1975.

COMMON SNIPE *Gallinago gallinago*

Present throughout the year. Breeds. Autumn/winter influx. Highest recorded number - 250+, late October 1985 (*SB* 14: 106).

LONG-BILLED DOWITCHER *Limnodromus scolopaceus*

One record. Single, 2 May 1969.

WOODCOCK *Scolopax rusticola*

Present throughout the year. Breeds. The winter population is occasionally augmented as a result of 'hard-weather movement' from the east of Scotland. More regular passage on Loch Lomondside occurs in October-November and again in February.

BLACK-TAILED GODWIT *Limosa limosa*

Passage Migrant. Spring birds in full breeding plumage. A recent trend towards rather late autumn passage (October to mid-November). Size of parties very variable. Highest recorded number - 60, 27 April 1963.

BAR-TAILED GODWIT *Limosa lapponica*

Passage migrant. Irregular. Singles and small groups. Highest recorded number - seven, 4 May 1974, 27 August 1981 (*SBR* 1981: 29) and 20 August 1989 (*CB* 3: 34).

WHIMBREL *Numenius phaeopus*

Passage Migrant. Most frequent in spring (April-May). Singles and small groups. Highest recorded number - 21, 8 May 1966.

CURLEW *Numenius arquata*

Summer Visitor / Passage Migrant (only the occasional bird in mid-winter). Breeds. Passage most marked in late February to March. Size of flocks very variable. Highest recorded number - 350, 12 March 1989 (*CB* 3: 35).

SPOTTED REDSHANK *Tringa erythropus*

Passage Migrant. Irregular. Most frequent in late summer/autumn (August-September). Usually singles. Highest recorded number - three, 17 August and 11 September 1978.

COMMON REDSHANK *Tringa totanus*

Summer Visitor / Passage Migrant (only the occasional winter record). Breeds. As a migrant, recorded in small numbers in spring with only the odd bird in autumn.

GREENSHANK *Tringa nebularia*

Passage Migrant (two winter records). Singles and very small groups. Highest recorded number - ten, 14 August 1968.

GREEN SANDPIPER *Tringa ochropus*

Passage Migrant. Irregular. Most frequent in late summer (July-August). Almost all singles, two birds being recorded on only two occasions.

WOOD SANDPIPER *Tringa glareola*

Passage Migrant. Irregular. All singles. Exceptional record of one summer bird song-flighting, 9-26 June 1982 (*LLBR* 11: 5).

COMMON SANDPIPER *Actitis hypoleucos*

Summer Visitor / Passage Migrant. Breeds. Passage most marked in July. Highest recorded number - 64, 25 July 1977 and 14 July 1978.

TURNSTONE *Arenaria interpres*

Passage Migrant. Irregular. Singles and very small groups. Highest recorded number - 16, 1 August 1982 (*SBR* 1982: 28).

WILSON'S PHALAROPE *Phalaropus tricolor*

One record. Single male, 3 June 1983 (Mitchell, 1984b).

RED-NECKED PHALAROPE *Phalaropus lobatus*

Four records. All singles - 28 June 1971, 9 June 1974, 10 June 1978 and 17 June 1979.

GREY PHALAROPE *Phalaropus fulicarius*

One record. Single, 6 October 1985 (*SB* 14: 108).

ARCTIC SKUA *Stercorarius parasiticus*

Four records. Two, 21 April 1963; singles, 20 October 1966 and 27 August 1978; 4, 29 April 1981 (*SBR* 1981: 31).

GREAT SKUA *Stercorarius skua*

Two records. Both singles - 30 December 1968 (*SN* 1984: 30) and 21 September 1979.

LAUGHING GULL *Larus atricilla*

One record. Single, 2 April 1968. First record for Scotland.

LITTLE GULL *Larus minutus*

Irregular Visitor. Most frequent late summer (July to early September). Usually singles. Highest recorded number - eight, 23 August 1981 (*SBR* 1981: 32).

BONAPARTE'S GULL *Larus philadelphia*

One record. Single, shot at end of April 1850. First record for Scotland.

BLACK-HEADED GULL *Larus ridibundus*

Summer Visitor (occasional birds at other times of the year). Breeds. Formerly bred in large numbers - estimated 5,000 pairs at peak in the mid-1930s to early 1940s. Colony ceased after 1985, but individual pairs have nested or attempted to nest since then.

COMMON GULL *Larus canus*

Present throughout the year. Breeds. A few pairs nest on moored boats in Balmaha Bay and elsewhere. Autumn/winter influx to roost on land or in the loch. Highest recorded number - 1,450, 3 January 1984 (LLBR 13: 5).

LESSER BLACK-BACKED GULL *Larus fuscus*

Summer Visitor (Occasional birds in mild winters). Nesting attempts in 1972 and 1980 (LLBR 10: 15). Highest recorded number - 70, 18 April 1982 (J. Mitchell).

HERRING GULL *Larus argentatus*

Present throughout the year. Small number of non-breeding birds in summer. In winter, 2,000+ birds regularly pass through the area to roost on the loch.

ICELAND GULL *Larus glaucoides*

Two records. Both singles - 13 May 1973 and 30 April 1987 (CB 1: 44).

GLAUCOUS GULL *Larus hyperboreus*

Three records. All singles - 24 November 1968, 16 January and 13 August 1979.

GREAT BLACK-BACKED GULL *Larus marinus*

Present throughout the year. Small numbers of non-breeding birds in summer (one unconfirmed breeding record). Winter influx. Highest recorded number - 100+ on several occasions.

KITTIWAKE *Rissa tridactyla*

Five records. All singles - 4 January and 4 September 1978, 22-23 November 1980 (SBR 1980: 36), 11 August 1981 (SBR 1981: 33) and 3 January 1984 (LLBR 13: 5).

CASPIAN TERN *Sterna caspia*

Two records. Both singles - 7 August 1968 (first record for Scotland) and 4 July 1976.

SANDWICH TERN *Sterna sandvicensis*

Irregular Visitor. Most records refer to birds passing between the firths of Forth and Clyde. Highest recorded number - seven, 16 July 1978.

COMMON TERN *Sterna hirundo*

Summer Visitor. Formerly bred, with up to thirty nests in the mid-1930s and again 1959-1960. Twenty nests in 1972 (*SN* 1984: 31). Last recorded nesting in the early 1980s.

ARCTIC TERN *Sterna paradisaea*

Irregular Visitor. One pair bred in 1977 and two pairs in 1978, but none thereafter.

LITTLE TERN *Sterna albifrons*

Two records. Both singles - 5 June 1960 and 10 July 1971.

BLACK TERN *Chlidonias niger*

Irregular Visitor. Mainly singles. Highest recorded number - three, 11 September 1968 and 8 May 1971.

GUILLEMOT *Uria aalge*

Irregular Visitor. Mainly singles, following storms in the Firth of Clyde. Highest recorded number - four, 5 October 1985 (*LLBR* 14: 6).

RAZORBILL *Alca torda*

Three records. All singles (after storms) - 1 October 1981 (*SBR* 1981: 34), 13 September 1982 (*SBR* 1984: 31) and 15 September 1985 (*SB* 14: 11).

LITTLE AUK *Alle alle*

Four records. All singles (after storms) - c. 1935 (*SN* 1984: 32), 21 October 1984 (*SBR* 1984: 33), 15 January 1986 (*SB* 14: 243) and 21 February 1988 (*CB* 2: 43).

STOCK DOVE *Columba oenas*

Present for much of the year. Suspected breeding. Very small numbers reported, but probably overlooked.

WOODPIGEON *Columba palumbus*

Present throughout the year. Breeds. Autumn-winter influx, particularly in good acorn years. Formerly flocks could be numbered in hundreds when cereals were grown in the area.

COLLARED DOVE *Streptopelia decaocto*

Present throughout the year. Breeds. First pair recorded in 1968, becoming firmly established by 1975 (SN 1984: 32). Highest recorded number in a flock - 20, December 1979.

TURTLE DOVE *Streptopelia turtur*

One record. Single, 30 July 1989 (CB 3: 42).

ALEXANDRINE PARAKEET *Psittacula eupatria*

[One record. Single, 14-24 November 1985 (LLBR 14: 6)].

CUCKOO *Cuculus canorus*

Summer Visitor / Passage Migrant. Breeds. An unusual gathering of ten adults, 19 May 1970 (SN 1984: 33). Autumn passage of single juveniles occasionally observed in August.

BARN OWL *Tyto alba*

Present throughout the year. Still breeds? The 1980s saw the steady desertion of once regular breeding and roosting sites.

SCOPS OWL *Otus scops*

One record. Two, 2 November 1968.

TAWNY OWL *Strix aluco*

Present throughout the year. Breeds. Ground sites not uncommon.

LONG-EARED OWL *Asio otus*

Irregular Visitor. Bred in at least two localities up to the early 1960s. A short-lived roost of at least three birds in Aber Bog willows during the winter of 1988-89 (J. Mitchell).

SHORT-EARED OWL *Asio flammeus*

Occasional Visitor. Almost all singles, two being recorded on only two occasions. Formerly a regular winter visitor, but with the collapse of the small mammal population due to the increase in flooding, sightings became less frequent during the 1980s.

NIGHTJAR *Caprimulgus europaeus*

No records for forty years. Formerly regular in the Gartfairn area up to the 1930s, and still occasionally heard around Balmaha in the late 1940s. An undated specimen in the Ross Priory collection.

SWIFT *Apus apus*

Summer Visitor / Passage Migrant. Nests at Ross Priory. Passage occasionally well marked. Highest recorded number - c. 1,000, 2-3 June 1983 (LLBR 18: 5).

KINGFISHER *Alcedo atthis*

Occasional Visitor, with frequency of sightings increasing during the 1980s. Almost all singles. Bred up to the 1940s (SN 1984: 34). Pair present during the summer of 1989, but no evidence of breeding obtained (LLBR 18: 5).

BEE-EATER *Merops apiaster*

[One probable record. Single bird answering to the description of the species, 9-10 October 1978].

HOOPOE *Upupa epops*

One record. Single, 22 September to 3 October 1977.

GREEN WOODPECKER *Picus viridis*

Occasional Visitor. All singles. Recorded annually 1970-1985, but only two recorded sightings since then.

GREAT SPOTTED WOODPECKER *Dendrocopos major*

Present throughout the year. Breeds. A minimum of three nesting pairs recorded each year. First recorded nesting in the Endrick Mouth area in 1921.

SKYLARK *Alauda arvensis*

Present throughout the year. Breeds. Flocks of up to 60 birds recorded during the winter months.

SAND MARTIN *Riparia riparia*

Summer Visitor / Passage Migrant. Breeds. Nesting colony of 50+ pairs on the River Endrick between Kilmarnock Castle and Drymen Bridge. Passage well marked, particularly in late summer/early autumn, with build-up to several hundred birds prior to departure south.

SWALLOW *Hirundo rustica*

Summer Visitor / Passage Migrant. Breeds. Hundreds of migrant Swallows sometimes assemble from late April to mid-May, particularly if northwards movement held up by cold weather. Return southwards usually most marked in early September, again with several hundred birds present.

HOUSE MARTIN *Delichon urbica*

Summer Visitor / Passage Migrant. Breeds. Build-up of large numbers of passage birds far less frequent than the previous two species, but several hundred present 6-7 September 1985 (LLBR 14: 6).



TREE PIPIT *Anthus trivialis*

Summer Visitor / Passage Migrant. Breeds. Highest recorded number on passage - 100+, 28 August 1988 (CB 2: 48).

MEADOW PIPIT *Anthus pratensis*

Present throughout the year. Breeds. Highest recorded number on passage - 250, 12 September 1978.

ROCK PIPIT *Anthus spinoletta*

Five records. All singles - 5-9 March 1970, 30 January 1977 identified as a Water Pipit - the central and southern European sub-species *Anthus spinoletta spinoletta*, 12 February 1978 (SN 1984: 35), 21 September 1978 and 11 August 1981 (SBR 1981: 39).

YELLOW WAGTAIL *Motacilla flava*

Passage Migrant (occasional Summer Visitor). Irregular. One pair nested in 1982 and 1983 (LLBR 11: 5 and 12: 5).

GREY WAGTAIL *Motacilla cinerea*

Present for much of the year. Breeds. Only two regular nesting sites - Mar Burn and Drymen Bridge.

PIED WAGTAIL *Motacilla alba*

Present for much of the year. Breeds. Two roost sites on record, with up to 70 birds assembled on 21 September 1979. Highest recorded number on passage - 100, 20 July and 12 September 1978.

The nominate species, *Motacilla alba alba* (White Wagtail), occurs only as a passage migrant. In April to early May, in excess of 100 birds trickling through the area over the course of a few hours noted on several occasions.

WAXWING *Bombycilla garrulus*

Winter Visitor. Irregular. Subject to periodic irruptions into Scotland. Highest recorded number - 17, 30-31 October 1965 and 8 March 1971 (SN 1984: 35).

DIPPER *Cinclus cinclus*

Present throughout the year. Breeds. One or two pairs nest annually beside the Mar Burn. Formerly bred on the Mill Burn below Drymen (SN 1984: 36).

WREN *Troglodytes troglodytes*

Present throughout the year. Breeds.

DUNNOCK *Prunella modularis*

Present throughout the year. Breeds.

ROBIN *Erithacus rubecula*

Present throughout the year. Breeds.

REDSTART *Phoenicurus phoenicurus*

Summer Visitor / Passage Migrant. Breeds. As a nesting species, sparingly distributed throughout the mature wooded areas.

WHINCHAT *Saxicola rubetra*

Passage Migrant / Summer Visitor. Still breeds? Last recorded nesting in 1982. Highest recorded number on passage - twelve, 20 August 1971 (SN 1984: 36).

STONECHAT *Saxicola torquata*

Irregular Visitor. Formerly bred. Last recorded nesting in 1976. Only five sightings recorded since the cold winter of 1978/79.

WHEATEAR *Oenanthe oenanthe*

Passage Migrant. Formerly bred. Nested up to the early 1950s (I.C. Christie). Passage of the nominate European race *Oenanthe oenanthe oenanthe* late March to early April, with the return in August. Highest recorded number - 50, 20 August 1971 (SN 1984: 36).

Individual passage birds, which occur almost annually in a two-week period centred around 8-21 May, display characteristics of the Greenland race *Oenanthe oenanthe leucorrhoea*.

RING OUZEL *Turdus torquatus*

No modern record. A single undated specimen in the Ross Priory collection.

BLACKBIRD *Turdus merula*

Present throughout the year. Breeds. Autumn and winter influx.

FIELDFARE *Turdus pilaris*

Winter Visitor / Passage Migrant. Although many hundreds pass through in late autumn, perhaps no more than 300 birds winter in the area.

SONG THRUSH *Turdus philomelos*

Present for much of the year (absent during severe weather). Breeds.

REDWING *Turdus iliacus*

Winter Visitor / Passage Migrant. Thousands occasionally pass through in late autumn, with up to 500 birds wintering in the area.

MISTLE THRUSH *Turdus viscivorus*

Present throughout the year. Breeds. Mainly confined to gardens and open wooded areas.

GRASSHOPPER WARBLER *Locustella naevia*

Summer Visitor / Passage Migrant. Breeds. Numbers fluctuate from one year to the next, with many more males recorded singing in spring than pairs staying to breed.

SEDGE WARBLER *Acrocephalus schoenobaenus*

Summer Visitor / Passage Migrant. Breeds. Can occur in quite high densities in fen areas being colonised by willow. Numbers 'crashed' in 1986, but have been steadily recovering since then.

WHITETHROAT *Sylvia communis*

Summer Visitor / Passage Migrant. Breeds. Formerly much more common. Totally absent in 1969 following national 'crash' in numbers, but a slow recovery has been taking place since 1970.

GARDEN WARBLER *Sylvia borin*

Summer Visitor. Breeds. Pairs thinly distributed in woodlands with well developed undergrowth.

BLACKCAP *Sylvia atricapilla*

Summer Visitor. Breeds. Similar habitat to Garden Warbler.

WOOD WARBLER *Phylloscopus sibilatrix*

Summer Visitor. Breeds. Became well established as a breeding species during the 1980s; Gartfairn and Ring Woods in particular.

CHIFFCHAFF *Phylloscopus collybita*

Summer Visitor / Passage Migrant. Breeds. Nesting pairs mainly confined to areas of rhododendron overhung by trees, but the occasional pair will utilise young conifer plantations bordered by tall trees. Usually more singing males recorded in early spring than actually stay to breed.

WILLOW WARBLER *Phylloscopus trochilus*

Summer Visitor / Passage Migrant. Breeds. The commonest warbler, occupying a wide range of habitats. Marked passage of 'autumn' migrants in the second half of July and early August.

GOLDCREST *Regulus regulus*

Present throughout the year. Breeds. A characteristic species of conifer woodlands, but one pair recorded nesting in gorse bushes in 1972.

SPOTTED FLYCATCHER *Muscicapa striata*

Summer Visitor. Breeds. Sparingly distributed in woods and gardens.

PIED FLYCATCHER *Ficedula hypoleuca*

Summer Visitor. Has bred. Only four recorded sightings up to 1989, when a pair bred (unsuccessfully) in a nest box (CB 3: 58).

LONG-TAILED TIT *Aegithalos caudatus*

Present throughout the year. Breeds. Winter influx of small flocks. Highest recorded number - 60, 25 November 1973 (SN 1984: 38).

WILLOW TIT *Parus montanus*

Five records. All singles - 20 February 1977, 12 November 1983 (LLBR 12: 5), 6 March and 20 March 1984 (SBR 1984: 44) and 26 March 1989 (CB 3: 59).

COAL TIT *Parus ater*

Present throughout the year. Breeds. Winter influx.

BLUE TIT *Parus caeruleus*

Present throughout the year. Breeds. Winter influx.

GREAT TIT *Parus major*

Present throughout the year. Breeds. Winter influx.

TREECREEPER *Certhia familiaris*

Present throughout the year. Breeds.

RED-BACKED SHRIKE *Lanius collurio*

One record. Single female/juvenile, 28 August to 1 September 1986 (LLBR 15: 5).

GREAT GREY SHRIKE *Lanius excubitor*

Winter Visitor. Almost annual up to 1977, but only recorded in 1983 since then. All singles, with the exception of two present, 6 February 1983 (LLBR 12: 5).

**JAY** *Garrulus glandarius*

Present throughout the year. Breeds. Thinly distributed in wooded areas. Autumn influx in good acorn years, when small flocks of six or more birds may be present.

**MAGPIE** *Pica pica*

Present throughout the year. Breeds. After a long period of absence following persecution, the species re-appeared in the area in the 1950s, although nesting was not proved until 1970-1973. Then followed another gap until 1984, since when the Magpie has both increased and nested annually.

**JACKDAW** *Corvus monedula*

Present throughout the year. Breeds. Main colonies at Ross Priory and Buchanan Castle.

**ROOK** *Corvus frugilegus*

Present throughout the year. Breeds. Six separate colonies totalling some 260 nests at the last full census in 1987 (Mitchell, 1988). A former large winter roost at Buchanan Castle has been abandoned, a smaller roost being formed in the Ring Woods.

**CROW** *Corvus corone*

The Carrion Crow *Corvus corone corone* is present throughout the year. Breeds. Occasionally forms non-breeding flocks. Highest recorded number in a flock - 25, March to April 1973.

The Hooded Crow *Corvus corone cornix* is an occasional visitor. Usually singles in winter. Remarkably few Hooded Crows penetrate south of the Highland line at Balmaha. Highest recorded number - four, 10 October 1976.

**RAVEN** *Corvus corax*

Occasional Visitor. One or two birds may occur at any time of the year. An exceptional record of 14 Ravens soaring in a thermal over a sandbar at the river mouth, 12 August 1962.

**STARLING** *Sturnus vulgaris*

Present throughout the year. Breeds. Assemblies of juvenile birds on the marshes are a particular feature of the summer months. Winter influx.

HOUSE SPARROW *Passer domesticus*

Present throughout the year. Breeds. Usually confined to the vicinity of human habitation, particularly farms.

TREE SPARROW *Passer montanus*

Irregular Visitor. Usually one or two birds, but 'several' recorded mobbing a Sparrowhawk with prey, 7 December 1974. Only two recorded sightings in the 1980s.

CHAFFINCH *Fringilla coelebs*

Present throughout the year. Breeds. Winter influx, some flocks totalling hundreds of birds.

BRAMBLING *Fringilla montifringilla*

Winter Visitor. Occasional one or two birds in Chaffinch flocks. Highest recorded number - 30+, January 1954.

GREENFINCH *Carduelis chloris*

Present throughout the year. Breeds. Increase in numbers throughout the 1980s, particularly in gardens at Buchanan Castle and Ross Priory. Highest recorded number - 190, 6 March 1983 (*LLBR* 12: 5).

GOLDFINCH *Carduelis carduelis*

Present for much of the year. Breeds occasionally. Late summer influx, with flocks of up to 50 birds feeding on thistles recorded on several occasions.

SISKIN *Carduelis spinus*

Present throughout the year. Breeds. Winter influx. Highest recorded numbers - 'several hundred', 31 October 1977, and 300, mid-December 1985 (*LLBR* 14: 7).

LINNET *Carduelis cannabina*

Present throughout the year. Breeds. Late summer influx to feed on thistles. Highest recorded number - 60, 31 August 1977 and 5 September 1988 (*CB* 2: 63).

TWITE *Carduelis flavirostris*

Occasional Visitor. Usually spring and autumn to early winter. Only one or two birds in spring, the larger groups occurring in the second half of the year. Highest recorded number - 40, 6 October 1973 and 29 December 1975.

**COMMON REDPOLL** *Carduelis flammea*

Present throughout the year. Breeds. Winter influx. Highest recorded number - 300, mid-October to late November 1989 (*CB* 3: 65).

A single Mealy Redpoll, the nominate northern race *Carduelis flammea flammea*, recorded 24 January 1976.

**COMMON CROSSBILL** *Loxia curvirostra*

Five records. Two, 9 October 1975; 'small party', 17 October 1978; two, 30 January 1979; five, 17 October 1987 (*CB* 1: 72) and three, 2 April 1989 (*CB* 3: 66).

**BULLFINCH** *Pyrrhula pyrrhula*

Present throughout the year. Breeds. Pairs thinly distributed in wooded areas. Occasional winter influx. Highest recorded number - 40, 13 March 1983 (*LLBR* 12: 6).

**HAWFINCH** *Coccothraustes coccothraustes*

One record. Single, 8 April 1979.

**LAPLAND BUNTING** *Calcarius lapponicus*

Two records. Single male, amongst large flock of mixed finches and buntings, 26 January 1968; single male in full breeding plumage, 8-10 May 1984 (*LLBR* 13: 6).

**SNOW BUNTING** *Plectrophenax nivalis*

Winter Visitor. Irregular. Highest recorded number - 30, 15 January 1979.

**YELLOWHAMMER** *Emberiza citrinella*

Present throughout the year. Breeds. Pairs very thinly distributed in areas of gorse. Winter influx.

**REED BUNTING** *Emberiza schoeniclus*

Present throughout the year. Breeds.

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## FACTORS AFFECTING NESTING SUCCESS OF HOODED CROWS IN WEST AND NORTH-WEST SCOTLAND

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### Introduction

This paper describes nesting success and spacing of nests of Hooded Crows *Corvus corone* in north-west Sutherland. Some of the factors concerned, - distance from the sea-shore with a good supply of food, availability of nest sites, and the proximity of other nesting crows, are examined and compared with an earlier study at Drimnin, Argyll (Hewson and Leitch, 1982).

### Study area and Methods

The part of the Eriboll estate in north-west Sutherland (Figure 1), where this study was carried out in 1988/89, comprises some 62 square kilometres of moorland, with largely *Trichophorum* or *Molinia* heath, or Heather *Calluna vulgaris*, as the dominant vegetation. Small Birch *Betula* spp., often old or degenerate, grew in gullies which had escaped muirburn, and there were larger but equally old birch-woods on two hillsides. Above 150 m there were few trees, and crags apparently suitable for crows to nest on were used by Ravens *Corvus corax* and raptors, but not by Hooded Crows, which nested only in trees.

During the winter of 1988/89 all the 23 areas of woodland in the study area were searched for old crow nests, which survive for several years (Figure 1). Details were recorded of the tree species used and the height of nests above the ground, the height being estimated by eye. In the spring of 1989 all woods were searched for new nests before the trees came into leaf, and the distances from old nests were measured or estimated. All ten new nests found were subsequently visited to check for breeding success. Where young had hatched, these could usually be seen from points higher on the hillsides; earlier the incubating crows

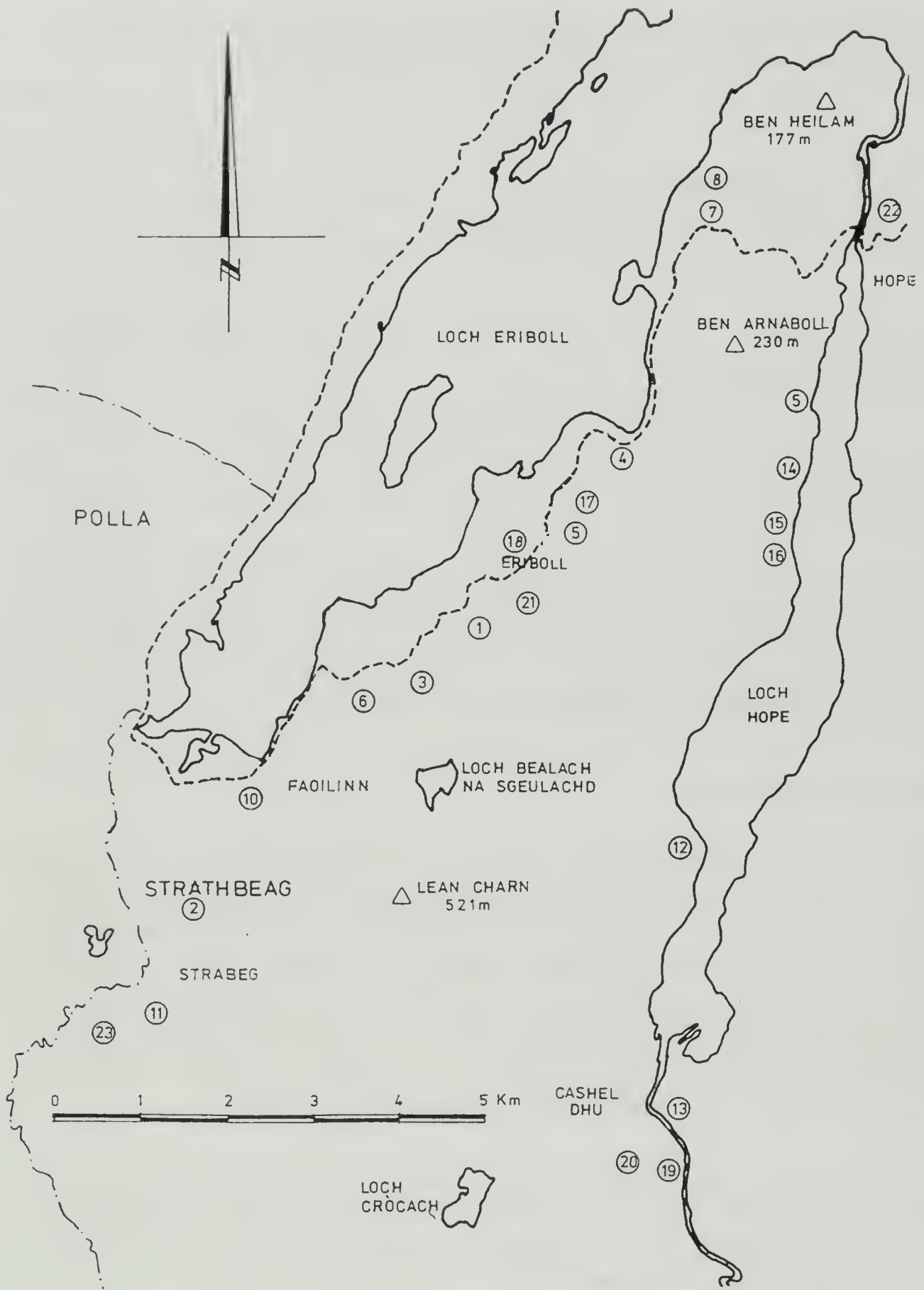


Figure 1

The Study Area

Part of the Eriboll estate in north-west Sutherland

could be seen without disturbing them. A few trees were climbed to examine the nest contents.

## Results

### Nesting Success

Six of the ten pairs of Hooded Crows which built nests in 1989 hatched young (Table 1). Nine areas of woodland, where crows had built nests in earlier years, were not used. Four clumps of apparently suitable trees contained no old or new crow nests. The six successful nests were, on average, 580 m (S.E. 111 m) from the shore, where crows regularly foraged. The four unsuccessful nests were significantly further away, with an average distance of 2,412 m (S.E. 1,293 m) (Mann-Whitney test,  $U = 2$ ,  $P = 0.019$ ).

Of the nests which failed, two were 300 m and 600 m respectively from successful nests. The other two were 1.65 km and 6.25 km from the shore.

Nests built in 1989 were nearer to the shore than those in the nine areas of woodland, where nests were built in previous years but were not used in 1989 (Table 2) ( $U = 19$ ,  $P < 0.05$ ).

### Nest Spacing

At Eriboll, crow nests were widely spaced and the areas of trees were relatively small. Mean distance between the nests built in 1989 was 1,422 m, substantially larger than the 471 m in Argyll. This excludes No. 13, where the nearest neighbouring nest was probably outside the study area. On a territory of 27.4 square kilometres below 150 m O.D., i.e. the area of ground suitable for nesting, there was one nest to 274 ha at Eriboll, and one nest to 39 ha at Drimnin. Over the whole study area at Eriboll there were eleven pairs of Hooded Crows, i.e. one pair to 564 ha. The study area at Drimnin (28 km<sup>2</sup>) and one pair to 127-140 ha (Hewson and Leitch, 1982), and Ardnish (12 km<sup>2</sup>), also in coastal Argyll, had one pair to 150-200 ha (Hewson, 1984).

Areas of woodland used in 1989 generally contained more than one nest, but those used in earlier years contained only one (Fisher test,  $P < 0.05$ ). The varying degrees of dilapidation of these old nests suggested that they had been built in different years, thus indicating only sporadic occupation of the areas. This was not

**Table 1**  
**Distances of Hooded Crow nests from the seashore and between nests built in 1989**

Area No. (see Fig. 1)	Successful nests in 1989			Former nests in area	Distance (m) between nests*	Length of woodland (m)
	Distance (m) of nest from shore	Distance (m) to next occupied nest	Distance (m) between nests*			
1	850	1500	15, 45, 35	3	350	
4	250	1000	25, 45	2	375	
5	800	1000	20, ?	2	400	
6	600	1600	70, 300, 230	3	500	
7	600	3000	20, 25, 45, 70	4	325	
10	400	1600	20	1	150	
Unsuccessful nests in 1989						
9	1650	2200		1	1150	
13	6250	outside study area		2	275	
17	750	300		1	200	
21	1000	600		0	300	

\* includes both former and new nests

Table 2

**Sites used by Hooded Crows prior to 1989**

Site numbers are shown on Figure 1

Site No.	Distance from sea (m)	Former nests
2	1800	1
3	950	1
8	200	1
11	3250	1
12	4400	1
15	2100	2
16	2300	1
19	6500	1
23	3700	1

due to differences in the extent of suitable trees. Two unused sites, Nos. 11 and 23, were in the largest extent of woodland in the study area.

Generally the nests were towards the middle of wooded areas; in some cases the trees were taller here than at the periphery.

### Nest Sites

Out of 36 nests, 34 were in Birch and two were in Holly *Ilex aquifolium*. Nests were at a mean height of 6.1 m (S.E. 0.4 m). One nest was built upon the foundations of an old nest, and another used part of an old nest alongside the new one. The lowest nest was c. 2.0 m above the ground.

### Areas Not Used

Successful nests were in woodland or clumps of old or degenerate Birch, fairly uniform in structure, as were those nests, further from the sea, which failed in 1989. Four apparently suitable areas of trees, however, had no crow nests, old or new. One of these comprised one of the few young vigorous patches of Birch, about 6.0 m tall, in the study area. The growth form of these trees may not have offered sufficient support for a nest; in the same gulley, however, there were a few mature Birch and Rowan *Sorbus aucuparia* up to 10.0 m high.

Another area, a plantation of mature Scots Pine *Pinus sylvestris* and Spruce *Picea sitchensis* (No. 22), contained one current and three old Sparrowhawk *Accipiter nisus* nests. A third (No. 18), consisted of the policies around the house at Eriboll, mature Sycamore *Acer pseudoplatanus* with Ash *Fraxinus excelsior* and Larch *Larix laricina* spp., together with a small plantation of Spruce and Scots Pine, in which Sparrowhawks bred in 1989 and were seen harrying Hooded Crows in August. The nearest occupied, although unsuccessful, Hooded Crow nest was 600 m away (No. 21), and crows from this or the adjacent territory (No. 5) regularly foraged around Eriboll. The fourth site, No. 20, about 1.0 ha of Birch on a hillside, was far from the sea, and was within 500 m of a 1989 nest.

### Discussion

Availability of nest sites was not likely to have affected the number of Hooded Crows breeding at Eriboll. Crows nest on the ground, on cliff ledges, and in small isolated trees (Coombs, 1978), and the areas not used in 1989 had trees similar in height and extent to those which were used. Crows avoided the only two areas of conifers, although Loman (1980a) found in south Sweden that conifers were preferred, and that these nests suffered less predation than those in deciduous trees. Perhaps, at Eriboll, the presence of Sparrowhawks acted as a deterrent.

Roberts and Hawkins (1990) reported a similar situation between Choughs *Pyrrhocorax pyrrhocorax* and Peregrines *Falco peregrinus*.

Breeding success may be affected by the behaviour of other crows; non-breeding crows prey upon crow eggs and fledglings, and this can be an important cause of nest failure (Loman, 1980b). At Eriboll, small flocks of crows had dispersed before the breeding season, and there appeared to be no non-territorial crows subsequently. However, unsuccessful nests at Eriboll were situated 300 m and 600 m from successful nests, compared with a mean spacing of 1,617 m between successful ones, and interactions (calling, chasing) occurred in this area. Of unoccupied sites, the apparently suitable policies at Eriboll (No. 18) were 700 m from a successful nest and 600 m from an unsuccessful one, and crows from adjacent territories foraged there; the remote No. 23 was about 500 m from an occupied nest. Interactions between crows could well have accounted for two unsuccessful nests and an unoccupied site, all in the same area.

Occupation of areas with suitable trees, and the proportion of successful nests, each decreased further away from the sea at both Eriboll and Drimnin. Young crows are fed largely upon invertebrates (Houston, 1977), which at Eriboll were collected upon the shore where crows regularly foraged throughout the year. There was less food inland than in Argyll, where crows had access to cattle food, and to sheep and deer carrion in winter when other food tends to be scarce (Houston, 1977). There were few cattle at Eriboll, and carrion, measured in the same way as in Argyll, was much less abundant (R. Hewson, unpublished data). A lower density of crows would be expected, and the overall density of crows at Eriboll was lower, and below 150 m much lower, than in Argyll (Hewson and Leitch, 1982) and in north-east Scotland (Picozzi, 1975).

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## THE NESTING OF THE CURLEW IN BRITAIN: AN ANALYSIS OF RECORDS, 1946-1985

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### Introduction

The Curlew *Numenius arquata* is probably the commonest and most typical wader of British moorlands and upland grasslands. Its large populations (Parslow, 1967; Sharrock, 1976) and very obvious and evocative presence in spring when on territory, combine to confer on the species an aura as the quintessence of the high moors. Despite the difficulties of studying such a wary bird, with widely dispersed territories on relatively inaccessible breeding grounds, observers over the years have never failed to be challenged by the call of the Curlew. With species such as this, however, the accumulation of nesting data is only possible on a long-term basis, such as that offered by the completion of nest-record cards by large numbers of enthusiasts. In this way, sufficient information can be acquired for quantitative analysis.

Recent changes in habitat selection by breeding Curlews have been noted in Britain (e.g. Sharrock, 1976) and have been recorded elsewhere in Europe (Hilden, 1965; Pedersen, 1966). The purpose of this study was to complement the findings of Sharrock (1976) that Curlews have become more abundant as breeding birds at lower altitudes in Britain over the last forty years or so. The analysis of nest-record cards from the British Trust for Ornithology scheme presented an opportunity to investigate this, since samples of data are available from many parts of the country for the years from 1946. Nest-record cards were thus analysed from the period 1946-1985 in respect of habitat, altitude, breeding season, and nest success. In total, 1,743 cards were available for analysis; 834 recorded single visits, but only a few followed nesting from clutch completion to hatching.

### Sources of Data

Of the records available, the majority of cards were from Scotland and the north of England (78%), with almost 20% from the Midlands, southern England and Wales. The south-west of England was hardly represented at all, perhaps a reflection of the scarcity of nesting Curlews there (Sharrock, 1976). Regional

variations in card numbers might, of course, be due to observer distribution, but it is likely that most of the main breeding areas were covered by the data from the scheme.

Preliminary analysis showed no obvious differences in detail between the nine 'Euring' areas of Britain, so for comparisons between regions the country was divided into two - the North (Euring areas 05, 07, 08, 09) and the South (areas 01, 02, 03, 04, 06) (see Shaw, 1978). The dividing line was thus across Britain approximately from the Mersey to the Humber.

The number of cards completed annually varied from 24 in the late 1940s to 60+ in the 1980s; over this time-scale it was sufficient to compare data from 1946-65 with 1966-85 to pick out long-term changes in the habits of the birds.

### **Analyses**

The four main influencing factors under investigation were Time (the two periods of twenty years each), Geography (North v. South), Altitude, and Habitat. Contingency analysis revealed a number of patterns and also instances where no clear patterns emerged; in some of these latter cases pooling of data was appropriate.

A total of 1,173 cards held comprehensive data on region, year, altitude and habitat (and sometimes useful clutch size/hatching data as well). These could be used to elucidate the interactions between various factors. Other specific analyses were enhanced by the inclusion of further cards with, perhaps, limited data (e.g. altitude quoted but no habitat, or vice-versa). These were clearly valuable additions to the totals being analysed in relation to specific parameters.

### **Habitat and Nest-Site**

That Curlews are well-known as moorland and upland breeding birds was confirmed by analysis of the cards (Tables 1 and 2). The most favoured habitats were moorland, heath/heather, and pasture. This last category indicated reasonable grazing land, rather than areas dominated by rushes or marshes, which in turn were included as the main component in the third habitat group - 'other'.

In the South the rushes/marshes group was of greater significance than in the North, where well over 80% of nests were in the other habitats. Broad initial comparisons between the two time-periods showed no major differences in habitat selection and this was confirmed by contingency analysis. Overall, the clear

**Table 1**

**Habitat Use by Nesting Curlews**  
Percentages, with column number totals

	North		South	
	1946-65	1966-85	1946-66	1966-85
Pasture	47.4	45.4	41.1	43.5
Moorland and heather	38.1	46.0	25.3	30.6
Rushes, marsh and others	24.5	8.6	33.5	25.9
n	430	863	158	193

Overall total = 1644 nests

Table 2

**Distribution of Curlew Nests**

Analysis of 1173 cards containing comprehensive data

Figures are percentages, with total for each quadrant shown in brackets

	North			South		
	Altitude (m)					
	0-122	123-245	246+	0-122	123-245	246+
1946-65						
Pasture	13	30	6	30	11	14
Moorland	12	14	20	3	0	17
Other*	1	3	0.5	14	3	8
			(202)			(36)
1966-85						
Pasture	22	15	9	29	10	8
Moorland	12	10	23	6	6	20
Other*	4	4	2	6	4	10
			(778)			(157)

\*Mainly rushes and marshy ground

conclusion showed pasture to be a dominant nesting habitat, particularly in the South. Table 3 shows the significant trends arising from detailed analysis.

Some nests were in unusual habitats, e.g. in salt-marsh, dune-slacks or on the edge of dune sands, in ploughed land, growing corn and stubble, in woodland edge, and even beside an airfield runway. In general, Curlews avoided cultivated ground and showed a marked preference for pasture and moorland, even in the lowlands; a similar observation was made by Pedersen (1966) for Curlews in Denmark. Nests were always sited directly on the ground in positions which gave clear views all around; long vegetation was avoided.

### Altitude

Tables 2 and 3 show that there was no difference in altitude of nest-sites over the forty years of the study, although in the North the majority of nest-sites seemed to be at mid-altitudes in the first time-period, with a shift to lower land in later years. In both regions, however, there appeared to be more moorland nests and fewer pasture nests at higher altitudes. Whether Curlews' use of areas below 123 m is increasing in real terms remains to be seen.

Examination of all cards with altitude data (Table 4) shows that nest distribution in the North tends to be even across the three altitude bands, whereas in the South there is a slightly higher proportion at lower levels. Breaking down the analysis and looking at habitat preferences at different altitudes (Table 2) reveals a shift towards lower *pastures* in the North, but all other comparisons show no changes of importance. The highest nest recorded was at 585 m (1,900 feet) in northern England.

### Nesting Season

The dates of laying of the first egg in a clutch were used to indicate the breeding season, following the methods of Newton (1964) and Mason and Macdonald (1976); either hatching or clutch completion dates were known for 348 cards. Von Frisch (1956) and Glutz von Blotzheim *et al.* (1977) state that the incubation period for the Curlew is 29 days; data from the present nest records, from clutch completion to hatching, also give a mean incubation period of 29.0 days (S.E. 0.26). Witherby *et al.* (1940) and Cramp, Simmons *et al.* (1983) suggest that eggs are laid on alternate days, so the first egg would be laid 35 days before hatching. From the spread of laying-dates of first eggs, the hatching period can be calculated by extrapolation. The nesting (= laying) season is displayed in Figure 1.

**Table 3****Results of Contingency Analysis of Data in Table 2**

(H - Habitat: G - Region: A - Altitude T - Time-period)

Interaction	df	$\chi^2$	p	Significance
H / G	2	24.5	0.0001	yes
H / A	4	51.1	0.0001	yes
G / A	2	16.1	0.0003	yes
H / G / A	4	9.8	0.04	yes
T / H	2	3.0	0.02	no
T / G	1	0.06	0.8	no
T / A	2	0.5	0.8	no
T / H / G	2	5.0	0.08	no
T / H / A	4	6.7	0.15	no
T / G / A	2	5.4	0.07	no
T / H / G / A	3	0.5	0.9	no

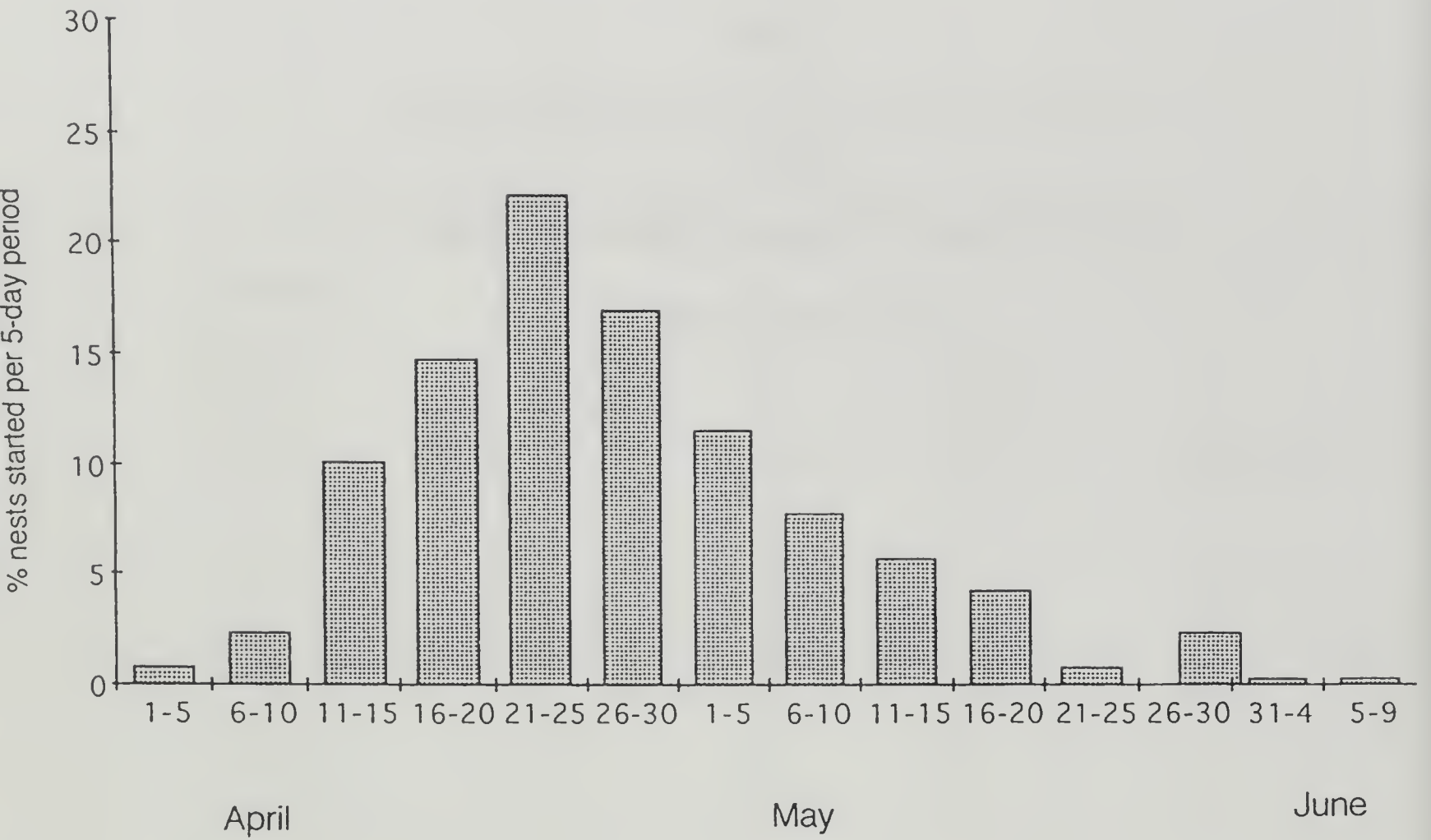
Conclusions from these analyses:

- (a) more moorland nests and fewer pasture nests at high altitudes in both regions.
- (b) more marsh and pasture nests in the south - and fewer moorland nests.
- (c) time has no effect on any of the above interactions, and interacts with none of the others (i.e. there have been no statistically significant changes over the years).

**Table 4****Nest Distribution in relation to Altitude and Region**

Numbers and percentage

Altitude (m)	North	South
0 - 122	340 (35)	83 (43)
123 - 245	312 (32)	37 (19)
246+	318 (33)	73 (38)

**Figure 1****The Nesting Season of British Curlews 1946-85**

Percentage of clutches started in each five-day period

N = 348



### Laying Date in Relation to Time, Region and Altitude

There was no difference in the actual range of laying dates between the two time periods, but there was some suggestion that a larger proportion of the birds nested slightly earlier in the period 1946-65 (Table 5); since the percentage of 1966-85 nests started by 20th April was lower, we may be witnessing a gradual shift in nesting season.

The range of laying dates was also very similar for both North and South nests, although by 20th April 40% of South nests had been started compared to 26% of North nests. Analysis of the data for nests in the altitude range 0-245 m, compared to those in the 245+ m range, showed no difference in modal laying date ( $d = 0.77$ ,  $p = > 0.1$ ), but indications were that nesting at lower altitudes commenced earlier (12.7% of the clutches below 245 m were started by 20th April, but only 3.8% on higher ground).

### Clutch Size

Clutch size was calculated by the method recommended by Newton (1964) (see Appendix 1). Many cards recorded only one visit to the nest, but 576 cards contained sufficient information for analysis. The mean clutch size was 3.81 (S.E. 0.02) (Table 6), which is very similar to figures quoted for Germany (3.78,  $n = 127$ ) by Glutz von Blotzheim *et al.* (1977) and in Finland (3.85,  $n = 239$ ) by Von Haartman *et al.* (1963). Clutch size comparisons revealed close similarities between regions, time periods, altitude bands, and throughout the breeding season (see Appendix 2). Changes in clutch size throughout the season have been demonstrated, however, in other wader species (Oystercatchers *Haematopus ostralegus* - Harris, 1967; Snipe *Gallinago gallinago* - Williamson, 1960; Tuck, 1972).

### Nesting Success

A total of 730 of the nest records had fates which were known; 60% of these were successful in hatching at least one young, 4% failed to complete the clutch (assuming a usual clutch size of four eggs), and 254 (35%) failed to complete incubation for the undernoted reasons:

Predated by birds or mammals	- 76%
Crushed by cattle or machinery	- 17%
Deserted	- 7%

**Table 5**  
**Changes in Laying Dates of Curlews**  
**1946-85**

Dates	n	Range	Peak	Starts by 20 April
1946-65	165	1/4 - 8/6	21/4 - 25/4	34%
1966-85	183	1/4 - 8/6	21/4 - 25/4	22%

**Table 6**  
**Clutch Size of Curlews**  
(n = 576)

Clutch size	2	3	4	5	6
n	18	90	453	12	3
%	3.1	15.6	78.6	2.1	0.5

Mean clutch size = 3.81 (s.e. 0.02)

## Appendix 1

### Estimating Clutch Size

(Newton, 1964: 57)

#### Clutches are included if:

(a) they are visited daily over the end of the laying period and the beginning of the incubation period.

or

(b) if they are visited during incubation -

(i) where no change in egg numbers occurred in two consecutive visits more than a day apart; or

(ii) once, after a sufficient number of days from a record of an incomplete clutch, to be sure that the full clutch was present

## Appendix 2

## Clutch Size data in relation to Time-Period and Laying Date

(I = 1946-65: II = 1966-85)

Clutch	c/2		c/3		c/4		c/5		mean	
	I	II	I	II	I	II	I	II	I	II
07/4 to 21/4	2	0	4	0	24	7	0	0	3.73	4.00*
22/4 to 06/5	3	1	17	10	43	56	1	1	3.65	3.83
07/5 to 21/5	3	1	5	3	27	31	2	2	3.75	3.92
22/5 to 05/6	1	0	3	0	11	8	0	0	3.67	4.00*

\* very small sample

The data, from the total of 638 nest records which contained some incubation information, were analysed to provide a more detailed picture of the survival of nests and eggs during the incubation period. The method used was that of Mayfield (1961, 1975) which permits the use of cards containing data on multiple nest visits, but for which the onset of incubation, hatching date and final fate is unknown. This method assumes a constant rate of loss or predation of nests throughout the incubation period, and uses, as its basic unit, the probability of a nest (or egg) surviving for one day. Daily losses (L) can be calculated by:

$$L = \frac{\text{total number of nests/eggs lost during incubation}}{\text{total number of days of observed nest/egg survival}}$$

Daily survival of nests (S) is  $1 - L$ . Survival of nests for the whole incubation period (I) is then calculated by:

$$I = S^n$$

where n is the number of days in the incubation period. From the data on the nests suitable for analysis, the probability of a nest surviving for any one day is

$$S = \frac{231}{9809} = 0.9765$$

and nest survival for the entire incubation period is:

$$I = 0.9725^{29} = 0.502, \text{ or } 50\%$$

so just half of Curlew nests survive throughout the incubation period. A similar exercise can be done with egg numbers, to take account of possible losses of eggs within clutches, thus giving a daily rate of egg survival:

$$S^e = \frac{1 - 947}{34331} = 0.9725$$

and survival of eggs for the whole incubation period as:

$$0.9725^{29} = 0.445 \text{ or } 44.5\%$$

Of 721 eggs recorded *over the days of hatching*, only 10.2% failed to hatch, mainly because of being addled or the chick dying during the hatching process.

Contingency analysis on the factors affecting nesting success revealed that neither time-period nor geographical region affected nesting success ( $\chi^2$  test: p values from 0.3 to 0.9).

Since Curlews are precocial birds and leave the nest soon after hatching, there are no data available, from the nest-record cards, by which to estimate fledging

success (most nests were last visited around the time of hatching). Hence calculation of survival rates of chicks is not feasible without further direct study of Curlew broods.

## Discussion

### Nesting Season

Like most species, Curlews presumably nest at such a time that the hatching of the young coincides closely with the period of highest food availability; this results in a pair raising as many young each year as local circumstances permit (Lack, 1966: 281-282). This present study, however, indicates that Curlews are hatching between the end of May and mid-July, i.e. at a time when their food supply, of earthworms, leatherjackets and other insect larvae (Cramp, Simmons *et al.*, 1983), is declining in abundance (Heppleston, 1972). Why then do Curlews not nest earlier? Presumably there is a link with:

(1) the female's need to produce over 300 g of eggs per clutch, which is more than any other European wader (Niethammer, 1942), and

(2) the availability of food during the period of egg formation.

Mason and Macdonald (1976) could not explain this apparently similar anomaly in the breeding season of the Snipe. It could be that the gains achieved by nesting earlier in the year are outweighed by some disadvantageous factor operating during incubation (or chick stage) of which we are unaware. Interestingly enough, however, there was some indication from the present study that, in the last twenty years or so, Curlews are tending to nest rather later within the range of laying dates.

### Habitat

Habitat preference analysis indicates that moorland and heath habitats remain the preferred breeding areas, but that Curlews may have moved to slightly lower altitudes. Possibly there might also be a tendency for the birds to nest earlier at lower altitudes. It may be that the requirements for nest placement and concealment, together with the need for adequate food supplies for the young, have to be found close together. Indeed, it is not uncommon to find Curlews nesting in heather, but feeding in the adjacent, more productive, pasture land (author's personal observation) now being found increasingly at lower altitudes as more hill land is reclaimed. A shift of broad habitat, whilst still retaining an attachment to traditional nesting micro-habitat, has occurred in Oystercatchers

(Heppleston, 1972), which have colonised inland habitats and are nesting in loose substrates similar to their preferred coastal shingle/sand. Behavioural changes in habitat selection have been more fully discussed by Hilden (1965).

Curlews are locally very abundant as lowland breeding waders; in Orkney they are the commonest, even although most land lies below 123 m and the birds are found nesting in fields within 30 m of the shore (author's personal observation; Lea and Bourne, 1975). In the south of Scotland, Curlews prefer rough grazing and pasture land, and are most abundant below altitudes of 300 m (Galbraith and Furness, 1983). Although species like Snipe may be suffering a substantial decline, due in part to habitat destruction (Mason and Macdonald, 1976), Curlews may be less affected in most areas due to an ability to utilise a wider range of habitats. The extent to which this may be true can only be verified by further extended studies.

### Nesting Success

The hatching success figure found from the analysis (44.5%) was less than those revealed in other wader studies, e.g. 75-82% for the Ringed Plover *Charadrius hiaticula* (Briggs, 1983), 72-91% for the Western Sandpiper *Charadrius mauri* (Holmes, 1972), and 55-84% for the Dunlin *Calidris alpina* (Soikkeli, 1967). Similar figures, however, pertained to Snipe (Mason and Macdonald, 1976). A value of 72% hatching success for Whimbrel *Numenius phaeopus* in Shetland (Grant, 1991) also falls within the overall range for all Charadrii (66-96%) given by Boyd (1962), but the Mayfield method used in this present Curlew study was not employed in all other cases and may account for the differing results.

### Survival

Combining the data on nest success with that on the mortality of Curlews after fledging, as recorded by Boyd (1962) and Bainbridge and Minton (1978), it may soon be possible to investigate survival and recruitment of the British population of the species. However, field data are not readily available for the estimation of chick survival during the pre-fledging period. Bainbridge and Minton (1978) noted that 19% of recoveries of Curlews ringed as chicks in Britain occurred within a few weeks of ringing, and from this they suggested that 81% of birds survived from ringing to fledging. If the assumption is made that, on average, Curlew chicks are ringed half-way through the pre-fledging period, and that mortality is constant throughout this period, then the survival rate from hatching to fledging is  $0.81^2 = 0.66$  or 66%, and thus mortality is 34%.



In summary, these (speculative) estimates are the only ones available for pre-fledging Curlew mortality, because collection of field data is extremely difficult for this species. Together with other assessments of mortality mentioned above, they will nevertheless take us closer to a tentative demographic model for Curlews.

### **Summary**

1. Data from 1,743 Curlew B.T.O. nest-record cards, covering the years 1946-1985, have been analysed.
2. In northern Britain, pasture and moorland were the preferred nest habitats; in southern Britain, pasture and rush/marsh were preferred.
3. A shift from mid-altitudes towards lower regions seemed evident to some degree, but the proportions at higher altitudes remained constant.
4. Laying season extended from 1st April to 9th June.
5. Half of the clutches were started by the end of April, although, in general, birds in the South nested a few days earlier than those in the North.
6. Incubation lasted 29 days, and the mean clutch size was 3.81.
7. Eggs had a 44% chance of reaching the hatching stage, and then a 90% chance of hatching successfully.
8. 50% of nests hatched at least one egg.
9. The main causes of nest loss were predation and farming activities.

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## CONTENTS

1994 - Part 1

- The Birds of the Endrick Mouth, Loch Lomond:  
An Update of the Annotated Check-List up to  
1st January 1990**  
By Mr. John Mitchell 3-30
- Factors Affecting Nesting Success of Hooded Crows  
in West and North-West Scotland**  
By Dr. Raymond Hewson and Mr. T.R. Talbot 31-38
- The Nesting of the Curlew in Britain:  
An Analysis of Records, 1946-1985**  
By Dr. Paul B. Heppleston 39-57

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